

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1-36. Canceled

37. (Currently amended) A nanoscale particle comprising an artificial membrane scaffold protein ~~variant~~ and at least one integral membrane protein, and optionally further comprising a phospholipid or a mixture of phospholipids, wherein said nanoscale particle has a diameter between 5 nm and 500 nm, wherein said artificial membrane scaffold protein ~~variant~~, in an aqueous environment, self-assembles in the presence or absence of phospholipid or in the presence of a mixture of phospholipids, into a nanoscale particle between about 5 nm and about 500 nm in diameter, wherein said membrane scaffold protein ~~variant~~ is amphipathic and wherein said membrane scaffold protein ~~variant~~ forms at least one alpha helix and wherein said protein is a seven transmembrane segment protein.

38. (Canceled)

39. (Previously presented) The nanoscale particle of claim 37 wherein said integral membrane protein is a receptor protein.

40. (Currently amended) The nanoscale particle of claim 39, 37, wherein said integral membrane protein is a G-protein coupled receptor.

41. (Previously presented) The nanoscale particle of claim 40, wherein said G-protein coupled receptor is a 5-hydroxytryptamine receptor.
42. (Currently amended) The nanoscale particle of claim 37, wherein said artificial membrane scaffold protein ~~variant~~ comprises an amino acid sequence selected from the group consisting of SEQ ID NO:6, SEQ ID NO:9, SEQ ID NO:17, amino acids 13 to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:23, amino acids 13 to 168 of SEQ ID NO:23, SEQ ID NO:29, amino acids 13 to 169 of SEQ ID NO:29, SEQ ID NO:43, amino acids 13 to 201 of SEQ ID NO:43, SEQ ID NO:44, amino acids 13 to 201 of SEQ ID NO:44, SEQ ID NO:45, and amino acids 13 to 392 of SEQ ID NO:45.
43. (Currently amended) The nanoscale particle of claim 37, wherein said membrane scaffold protein ~~variant~~ is fused genetically with the integral membrane protein.
44. (Withdrawn) A nanoscale particle comprising an artificial membrane scaffold protein ~~variant~~ and at least one embedded membrane protein, and optionally further comprising a phospholipid or a mixture of phospholipids, wherein said nanoscale particle has a diameter between 5 nm and 500 nm, wherein said artificial membrane scaffold protein ~~variant~~, in an aqueous environment, self assembles in the presence or absence of phospholipid or in the presence of a mixture of phospholipids, into a nanoscale particle between about 5 nm and about 500 nm in diameter, wherein said membrane scaffold protein ~~variant~~ is amphipathic and wherein said membrane scaffold protein ~~variant~~ forms at least one alpha helix.
45. (Withdrawn) The nanoscale particle of claim 44, wherein said membrane scaffold protein ~~variant~~ comprises the amino acid sequence selected from the group consisting of SEQ ID NO:6, SEQ ID NO:9, SEQ ID NO:17, amino acids 13

to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:23, amino acids 13 to 168 of SEQ ID NO:23, SEQ ID NO:29, amino acids 13 to 169 of SEQ ID NO:29, SEQ ID NO:43, amino acids 13 to 201 of SEQ ID NO:43, SEQ ID NO:44, amino acids 13 to 201 of SEQ ID NO:44, SEQ ID NO:45, and amino acids 13 to 392 of SEQ ID NO:45.

46. (Withdrawn) The nanoscale particle of claim 45, wherein the embedded membrane protein is a cytochrome P450.
47. (Withdrawn) A nanoscale particle comprising a tandem repeat membrane scaffold protein ~~variant~~ and at least one tethered membrane protein, and optionally further comprising a phospholipid or a mixture of phospholipids, wherein said nanoscale particle has a diameter between 5 nm and 500 nm, wherein said tandem repeat membrane scaffold protein ~~variant~~, in an aqueous environment, self assembles in the presence or absence of phospholipid or in the presence of a mixture of phospholipids, into a nanoscale particle between about 5 nm and about 500 nm in diameter, wherein said membrane scaffold protein variant has the amino acid sequence set forth in SEQ ID NO:17, amino acids 13 to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:45 or amino acids 13 to 392 of SEQ ID NO:45.
48. (Withdrawn) The nanoscale particle of claim 47, wherein the tethered membrane protein is a cytochrome P450 reductase, tissue factor or cytochrome b5.
49. (Withdrawn) A method for incorporating at least one integral membrane protein into a nanoscale particle which is stable and soluble in aqueous solutions, said method comprising the step of allowing a membrane scaffold protein ~~variant~~ and at least one integral membrane protein to self assemble into nanoscale particles in an aqueous solution, optionally in the presence of at least one phospholipid,

whereby nanoscale particles are formed, wherein said integral membrane protein is a seven transmembrane segment protein.

50. (Canceled.
51. (Withdrawn) The method of claim ~~50~~, 49, wherein said receptor protein is a G-protein coupled receptor.
52. (Withdrawn) The method of claim 51, wherein said G-protein coupled receptor is a 5-hydroxytryptamine receptor.
53. (Withdrawn) The method of claim 49, wherein said membrane scaffold protein ~~variant~~ comprises an amino acid sequence selected from the group consisting of SEQ ID NO:6, SEQ ID NO:9, SEQ ID NO:17, amino acids 13 to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:23, amino acids 13 to 168 of SEQ ID NO:23, SEQ ID NO:29, amino acids 13 to 169 of SEQ ID NO:29, SEQ ID NO:43, amino acids 13 to 201 of SEQ ID NO:43, SEQ ID NO:44, amino acids 13 to 201 of SEQ ID NO:44, SEQ ID NO:45, and amino acids 13 to 392 of SEQ ID NO:45.
54. (Withdrawn) A method for incorporating at least one embedded membrane protein into a nanoscale particle which is stable and soluble in aqueous solutions, said method comprising the step of allowing a membrane scaffold protein ~~variant~~ and at least one embedded membrane protein to self assemble into nanoscale particles in an aqueous solution, optionally in the presence of at least one phospholipid, whereby nanoscale particles are formed.
55. (Withdrawn) The method of claim 54, wherein said embedded membrane protein is a cytochrome P450.

56. (Withdrawn) A method for incorporating at least one tethered membrane protein into a nanoscale particle which is stable and soluble in aqueous solutions, said method comprising the step of allowing a membrane scaffold protein and the at least one tethered membrane protein to self assemble into nanoscale particles in an aqueous solution, optionally in the presence of at least one phospholipid, whereby nanoscale particles are formed, wherein said membrane scaffold protein ~~variant~~ consists essentially of the amino acid sequence set forth in SEQ ID NO:17, amino acids 13 to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:45 or amino acids 13 to 392 of SEQ ID NO:45.
57. (Withdrawn) The method of claim 56, wherein said tethered membrane protein is a cytochrome b5.
58. (Withdrawn) The method of claim 56, wherein said tethered membrane protein is a cytochrome P450 reductase.
59. (Currently amended) A tandem repeat membrane scaffold protein ~~variant~~ that, in an aqueous environment, self assembles in the absence of phospholipid or with a phospholipid or a mixture of phospholipids, into a nanoscale particle between 5 nm and 500 nm in diameter, wherein said membrane scaffold protein ~~variant~~ is amphipathic, wherein said membrane scaffold protein ~~variant~~ forms at least one alpha helix and wherein said protein has the amino acid sequence given in SEQ ID NO:17, amino acids 13 to 414 of SEQ ID NO:17, SEQ ID NO:19, amino acids 13 to 422 of SEQ ID NO:19, SEQ ID NO:45 or amino acids 13 to 392 of SEQ ID NO:45.
60. (canceled)